REMARKS

INTRODUCTION:

Claims 1-3, 5, 7-9, 11, 12, and 14-28 are pending and under consideration. Reconsideration is requested.

REJECTION UNDER 35 U.S.C. §103:

In the Office Action, at page 2, the Examiner rejected claims 1-3, 5, 7-9, 11, 12, and 14-28 under 35 U.S.C. §103(a) as being unpatentable over Tung et al., (US 6,435,641 – hereinafter Tung), in view of Miyazaki (US 6,305,856 – hereinafter Miyazaki). The reasons for the rejection are set forth in the Office Action and therefore not repeated. Applicant traverses this rejection and respectfully requests reconsideration.

As a general matter, to establish a prima facie obviousness rejection, the Examiner needs to provide evidence of the existence of individual elements corresponding to the recited limitations, a motivation to combine the individual elements to create the recited invention, and a reasonable expectation of success. (See MPEP, at 2143. – "'[t]he teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure.' In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).", and at 2143.03 – "'[t]o establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.' In re Royka, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).").

Should the Examiner fail to provide evidence that the individual elements exist in the prior art, or that the motivation exists in the prior art or in the knowledge generally available to one of ordinary skill in the art, then the Examiner has not provided sufficient evidence to maintain a prima facie obviousness rejection of the claim. (See MPEP, at 2143.03, and 2143.01).

Independent claim 1 recites: "...a second paper sensor mounted to the carrier a predetermined distance from the printer head, to detect a right edge, a left edge, the top edge, and the bottom edge of the paper; and a controller controlling operations of the printer head to control print margins of top and bottom ends of the paper by comparing first top edge and first bottom edge signals from the first paper sensor and second top edge and second bottom edge signals from the second paper sensor, and to control print margins of right and left edges of the paper according to left and right edge detections signals of the second paper sensor."

Independent claim 9 recites: "...detecting a left edge or a right edge of the sheet of paper when the second paper sensor moves transversely to at least one of the left edge or the right edge of the sheet of paper; and generating a begin print command at a later of the start print time interval and the second top edge detection signal, and generating an end print command at a later of the end print time interval and the second bottom edge detection signal."

Independent claim 24 recites: "...a second paper sensor connected with the carrier, to detect a right edge, a left edge, the top edge, and the bottom edge of the paper; and a controller, using right and left edge signals from the second paper sensor and comparing first top edge and first bottom edge signals from the first paper sensor and second top edge and second bottom edge signals from the second paper sensor, to control the printer head to start and stop printing on the paper."

Independent claim 26 recites: "...a second paper sensor mounted to the carrier a predetermined distance from the printer head and detecting the top edge, the bottom edge, and left and right edges of the paper; and a controller controlling operations of the printer head according to a comparison of signals from the first and second paper sensors...."

Independent claim 27 recites: "...detecting a top edge, a bottom edge, and at least one of left or right edges of the sheet of paper using the second paper sensor, to output a corresponding second top edge detection signal, a second bottom edge detection signal, and at least one of left or right edge detection signals; estimating a start print time based on the first top edge detection signal and generating a begin print command at a later of the estimated start print time and the second top edge detection signal; estimating an end print time based on the first bottom edge detection signal and generating an end print command at a later of the estimated end print time and the second bottom edge detection signal; and generating at least one of left or right edge print commands when the at least one of the left or right edges is detected."

And independent claim 28 recites: "...a first paper sensor mounted between a pickup unit and a convey unit to detect a top edge and a bottom edge of a paper; a second paper sensor mounted to the carrier a predetermined distance upstream, with respect to a paper traveling direction, from the printer head, and detecting the top edge, the bottom edge, and at least one of left or right edges of the paper; and a controller controlling operations of the printer head according to a comparison of signals from the first and second paper sensors."

While the device disclosed in Tung has both a media sensor 328 and an optical sensor

330, in the first of the two disclosed printing modes, the optical sensor 330 is not even employed. (See Tung, at col. 6, line 39 – col. 7, line 12).

In the second disclosed printing mode, in which three or more sheets are printed, the media sensor 328 is employed to determine a leading edge of a first unit of paper 12 and a trailing edge of the first unit of paper 12, to position the leading edge for printing, and to determine a length of the first unit of paper 12. (See Tung, at col. 8, lines 36-47, and col. 9, lines 18-27).

In the second printing mode, the media sensor 328 is also employed to determine a leading edge of a second unit of paper 12. Tung goes so far as to state that the media sensor 328 is not employed to determine a trailing edge of the second unit of paper, "...because media sensor 328 cannot be relied upon to sense the trailing edge of the second unit of paper 12 in the second mode of operation." (Tung, col. 9, lines 64-66).

Instead, the "...processor 320 determines (by looking at counts from rotary position encoder 316) if the trailing edge of the second unit of paper 12 reaches the nip region between the pinch rollers using the count of rotary position encoder 316 obtained from media movement controller 318 at the detection of the leading edge of the second unit of paper 12, the length of the second unit of paper 12, and the known distance from lever 332 of media sensor 328 to the nip region." (Tung, col. 10, lines 39-47).

The device disclosed in Tung then employs the optical sensor 330 to determine a leading edge of a third unit of paper 12 (and presumably the leading edges of any additional units of paper 12). (See Tung, at col. 11, line 23 – col. 12, line 16).

Regarding detecting a trailing edge of the third unit of paper, Tung appears to suggest that the media sensor 328 is employed, since once the trailing edge is determined, the processor 320 commands media movement controller 318 to move the trailing edge of the third unit of paper to the nip region between the pinch rollers (see Tung, at col. 14, lines 12-21), and the trailing edge would have already passed the nip region between the pinch rollers if it were detected by the optical sensor 330.

Thus, Tung appears to suggest that while the media sensor 328 is used to detect leading and trailing edges, the optical sensor is only used to detect leading edges of units of paper.

In the description of the two modes of operation of Tung's device (col. 6, line 39 – col. 14, line 27), each time the processor 320 tries to determine a leading or trailing edge of a unit of paper and polls the sensor controller 336, output from only one of the two sensors is obtained.

Further, regardless of operational mode, the controller 320 never compares input from the media sensor 328 with input from the optical sensor 330, for any unit of paper 12.

Further still, there is no suggestion in Tung to compare outputs from different sensors, nor any suggestion to even use output from more than one sensor to determine a given leading or trailing edge. Describing polling of the sensor controller 336 in the first operational mode, to determine a leading edge, Tung states: "[p]olling every 1.6 ms has been found to locate the leading edge with sufficient accuracy." (Tung, col. 6, lines 52-54). And describing the second operational mode, Tung states:

> "[t]he gap between successive units of paper 12 while operating in the second mode will be, in many cases, to small to permit the trailing edge of the earlier unit of paper 12 or the leading edge of the later unit of paper 12 to be detected by media sensor 328 because lever 332 will not rotate sufficiently in the gap between units of paper 12 to generate a change in the signal supplied to sensor controller 336. Therefore, for imaging operations performed in the second mode, the trailing edge and the leading edge of units of paper 12 will be detected in a different way." (Tung, col. 7, lines 32-42).

Thus, Applicant respectfully submits that Tung teaches away from comparing outputs from different sensors, or using output from more than one sensor to determine a given leading or trailing edge.

Additionally, while Tung states: "[u]nder firmware control, processor 320 polls sensor controller 336 to determine the state of the sensors," in the description of the two modes of operation of Tung's device (col. 6, line 39 – col. 14, line 27), each time the processor 320 tries to determine a leading or trailing edge of a unit of paper and polls the sensor controller 336, output from only one of the two sensors is obtained. Thus, Tung neither discloses nor suggests that the processor 320 polls sensor controller 336 to determine the state of more than one sensor at a time, or even to determine the state of more than one sensor for a given leading or trailing edge.

Further, operation of the device in Tung is described without referencing any comparison of signals. Applicant respectfully submits that that there is no indication in Tung that signals from the media sensor 328 are ever compared with signals from the optical sensor 330.

Applicant respectfully submits that Miyazaki fails to cure these defects.

Miyazaki discloses a method and apparatus for printing an image in a rectangular area on a recording material. More specifically, Miyazaki discloses two embodiments of printers (one

that uses a paper roll 2a of recording paper 2, and one that uses a pre-sized film pack 72 of photo films 70), that print an image in a rectangular area on a recording material even if the recording material is skewed with respect to a feeding (subscan) direction.

In the first embodiment (FIGS. 1-9 of Miyazaki), in an order of paper feeding in the subscan direction, the printer comprises: paper feeding roller pair 4; photo electric line sensor 29; photo interruptive sensor 28; thermal head 11, with heating element array 13 opposed to platen roller 14; optical fixing device 20; paper conveyer roller pair 16; cutter 26; and exit 25. The photo interruptive sensor 28 and the line sensor 29 detect a leading end and a side edge of the recording paper 2, respectively. (See Miyazaki, at col. 6, lines 32-34).

Miyazaki also discloses a controller 30 that calculates a position of frame area 6 on the recording paper 2, relative to the thermal head, on the basis of edge position data detected by line sensor 29. A motor driver 43 drives motor 8 under control of the controller 30. And an encoder 44 is mounted to the motor 8 to detect rotation of the motor 8 and output encoder pulses to the controller 30, which calculates an advanced length of the recording paper 2. (See Miyazaki, at col. 7, lines 4-10, and 54-60).

Miyazaki states:

> "At a timing when the color thermosensitive recording paper 2 is advanced by a length L3 from the detection of the leading end by the photo interruptive sensor 28, the system controller 30 drives the line sensor 29 to detect a side edge point "e" of the color thermosensitive recording paper 2, as shown in FIG. 4, wherein L3=L1-L2, and L1 is a distance between the heating element array 13 and a leading end of the pinch roller 16b, whereas L2 is a distance between the photo interruptive sensor 28 and the line sensor 29, respectively in the sub scan direction."
>
> "Simultaneously, the system controller 30 determines a reference point "f" as a point on the color thermosensitive recording paper 2 that is opposed to a center point of the line sensor 29 in the main scan direction at the time of detection of the side edge point "e". Since the line sensor 29 is aligned with the heating element array 13 with respect to the main scan direction, the center point of the line sensor 29 is on the center line of the paper path."
>
> "Thereafter, the system controller 30 determines coordinate values of the corner points "a", "b", "c" and "d" of the frame area 6, on the assumption that the reference point "f" is on a leading end 6a of the frame area 6 in the paper feeding direction. The leading end 6a should extend perpendicularly to the side edges of the color thermosensitive recording paper 2. Therefore, the corner points "a" and "c" are at cross points between the side edges of the color thermosensitive recording paper and a line that includes the reference point "f" and meets at right angles with the side edges." (Miyazaki, col. 8, lines 6-15, 17-24, and 35-45).

But since the leading end of the recording paper 2 has already passed photo interruptive

sensor 28 when point e is detected, leading end 6a of the frame 6 cannot be on the leading end of the recording paper 2, since photo interruptive sensor 28 is downstream of line sensor 29. (See Miyazaki, at col. 8, lines 60-67).

Subsequently, the recording paper is advanced a predetermined length while the controller continues counting the encoder pulses, and the line sensor again detects the edge of the recording paper. Then the controller 30 calculates an inclination angle of the recording paper, and calculates the relative position of the frame area 6 with respect to the thermal head 11.

Thus, in the first embodiment, Miyazaki neither discloses nor suggests comparing signals from the photo interruptive sensor 28 with signals from the line sensor 29. Further, since a bottom or trailing edge is determined by the cutter 26 only after printing is complete, the bottom or trailing edge is never detected by photo interruptive sensor 28 or line sensor 29. (See Miyazaki, at col. 12, lines 5-12).

In the second embodiment (FIGS. 10-17), in an order of paper feeding in the subscan direction, the printer comprises: optical printing head 77; ejection slot 88 of case 71; first side edge detector 96; feed roller pair 91; second side edge detector 97; photo interruptive sensor 98; developing roller pair 100; and lid 104.

First side edge detector 96 and second side edge detector 97 simultaneously detect respective side edge points of photo film 70 when photo interruptive sensor 98 detects a leading edge of solution pod 70b of photo film 70. (See Miyazaki, at FIGS. 10 and 12, and col. 14 line 57 to col. 17, line 18).

Based on the edge position data detected by the first and second side edge detectors 96 and 97, controller 106 calculates a position of exposure area 70a of photo film 70, relative to optical printing head 77. (See Miyazaki, at col. 16, lines 6-14). And encoder 120 is mounted on motor 92 to detect rotation of motor 92 and output encoder pulses to controller 106, which thereby calculates an advanced length of photo film 70.

Thus, in the second embodiment, Miyazaki neither discloses nor suggests comparing signals from the photo interruptive sensor 98 with signals from the first and second side edge detectors 96 and 97. Further, a bottom or trailing edge is never detected by any of photo interruptive sensor 98 or first and second side edge detectors 96 and 97.

Accordingly, Applicant respectfully submits that Miyazaki fails to cure the defects of Tung.

Further, contrary to the Examiner's assertion, Applicant respectfully submits that Miyazaki

does not teach "controllers 30 and 106 for controlling print margins according to the top, bottom, left and right edges detection signals from an interruptive sensor 28, a line sensor 29 and the side edge sensors 96,97...."

Thus, Applicant respectfully submits that neither Tung nor Miyazaki, either alone or in combination, discloses or suggests every element of the claims, arranged as required by the claims.

Accordingly, Applicant respectfully submits that the Examiner has failed to provide evidence that the individual elements exist in the prior art, and thus, the Examiner has not provided sufficient evidence to maintain a prima facie obviousness rejection of the claims.

Therefore, Applicant respectfully submits that independent claims 1, 9, 24, 26, 27, and 28 patentably distinguish over the cited art, and should be allowable for at least the above-mentioned reasons. Further, Applicant respectfully submits that claims 2, 3, 5, 7, 8, 11-19, 20-23, and 25 which ultimately depend from one of independent claims 1, 9, or 24, should be allowable for at least the same reasons as claims 1, 9, and 24, as well as for the additional features recited therein.

CONCLUSION:

In accordance with the foregoing, Applicant respectfully submits that all outstanding objections and rejections have been overcome and/or rendered moot, and further, that all pending claims patentably distinguish over the cited art. Thus, there being no further outstanding objections or rejections, the application is submitted as being in condition for allowance which action is earnestly solicited.

If the Examiner has any remaining issues to be addressed, it is believed that prosecution can be expedited and possibly concluded by the Examiner contacting the undersigned attorney for a telephone interview to discuss any such remaining issues.

Respectfully submitted,

STAAS & HALSEY LLP

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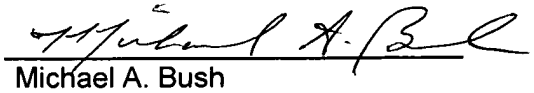
By: 

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